COASTAL & MARINE

Recalling ICZM

Insights from the Baltic

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Editorial

Dear Reader,

Coastal regions are among the most populated and productive areas, with outstanding economic and ecologic value. Increasing competition for maritime and coastal space and increasing pressures on resources lead to a deterioration of natural, socio-economic and cultural resources. The impacts of climate change are expected to further increase the exposure of the coast. In the past, coastal planning activities or development decisions took place in a sectorial way, hardly being linked to each other. This fragmented approach to planning and management leads to inefficient use of resources, conflicting claims on space and missed opportunities for more sustainable coastal development. As consequence, Integrated Coastal Zone Management (ICZM) emerged and received world-wide recognition after the United Nations Conference on Environment and Development (UNCED) in 1992 in Rio de Janeiro, Brazil. The exchange of experiences and learning from best practice examples plays an important role in ICZM. This explains why the European Commission developed and maintains the OURCOAST online database with documentations of about 350 European coastal best practice cases. The OURCOAST database does not include a definition and assessment of 'best practice'. The BONUS BaltCoast project does this step, and provides and applies a tool for the evaluation of best practices, based on a Systems Approach Framework. This volume of Coastal & Marine presents several coastal case studies and exemplary evaluation results.

Gerald Schernewski

Head of the Coastal & Marine Management group at Leibniz-Institute for Baltic Sea Research (IOW), Germany

Professor at Klaipeda University and scientist at the Marine Science and Technology Center (MARSTEC), Lithuania

President of the Coastal & Marine Union – EUCC, The Netherlands

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Coastal & Marine Union (EUCC)
P.O.Box 11232, NL-2301 EE Leiden
Telephone: +31.71.5122900
E-mail: admin@eucc.net, www.eucc.net
Visiting address: Breestraat 89A, 2311 CK Leiden, NL

Content

Colophon

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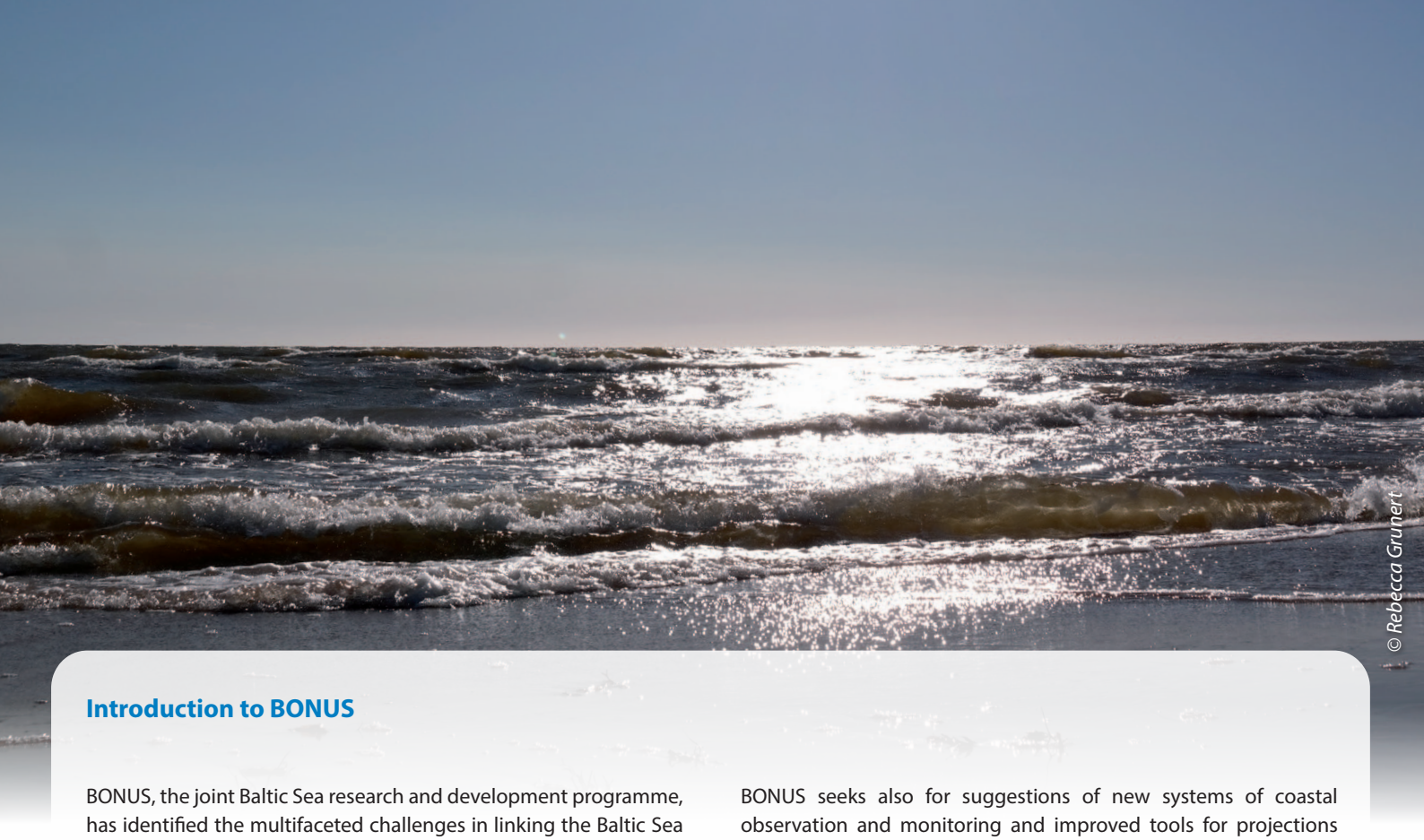

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Introduction to BONUS

BONUS, the joint Baltic Sea research and development programme, has identified the multifaceted challenges in linking the Baltic Sea with its coasts and catchment area as one of the programme's five strategic objectives. In fact, no other part of the sea provides as many ecosystem services vital for human well-being as the coasts. And yet, these are coasts, where human-induced pressures on the ecosystems are seen at their harshest.

Due to the increasing man-made impact on the highly dynamic coastal ecosystems, there is a need for interdisciplinary studies on the jointly developing and interacting socio-economic and ecological systems. Furthermore, there is a gap between the scientific research and integrated management, including, for example, spatial planning, impact analyses and changes in land cover. BONUS promotes the catchment-coast-sea continuum concept, which has been developed within the context of the Land-Ocean Interaction in the Coastal Zone Programme (now Future Earth Coasts programme). BONUS's attention is focused on two mutually interlinked issues related to coastal zone: the role of coastal systems in the dynamics of the Baltic Sea (theme 2.2) and integrated approaches to coastal management (theme 2.1).

The outcomes BONUS expects of studies on the role of coastal ecosystems include future projections, scenarios and support tools for decision makers, assessment of the present and future roles of coastal waters in terms of retention, transformation and transport of organic matter, nutrients and hazardous substances, assessment of changes in physical and biogeochemical processes as well as in food web dynamics at the freshwater–seawater interface (including also the coastal wetlands).

BONUS seeks also for suggestions of new systems of coastal observation and monitoring and improved tools for projections and predictions of coastal environment.

Within the context of integrated approaches to coastal management, BONUS expects development of new tools for coastal zone management, protection and adaptation that takes into account results of complex analysis of i.a. morphodynamic processes. These processes are linked to the full range of possible scenarios of climate impacts and development of socio-economic activities (e.g. ports, fishery, energy production, tourism, aquaculture etc.) and various types of ecosystem services. Also sought for are new solutions and services for harmonisation of the existing use of coastal areas in order to avoid conflicts of interest as well as science-based suggestions for diversifying the sustainable use of coastal areas. New solutions sought for include also eco-technologies for management of the open coast and coastal waters through protection of land along estuaries and inner coastal waters. Last but not least, we also need fit-for-purpose protection measures against flooding and extreme events, managed realignment of coastlines, land-use strategies and river management concepts.

Scenarios of future sustainable coastal management must take into full account the effects on coastal ecosystem functions and services caused by climate, morphodynamic and socioeconomic changes. The Systems Approach Framework applied by the BONUS BaltCoast project seems to be an appropriate tool to fulfil this complex and nontrivial and yet very practical and important task.

Andris Andrusaitis
Programme Manager, BONUS

BONUS
SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION

www.bonusportal.org

BONUS, the joint Baltic Sea research and development programme is implemented by the European Union together with the member states surrounding the Baltic Sea. It aims to facilitate generation of knowledge and know-how necessary to overcome the major challenges faced by the Baltic Sea region and ultimately to ensure the long-term sustainability of the Baltic Sea ecosystem services.

Approaches to ensure an effective coastal zone management in the Baltic and beyond

The Baltic Sea and its coasts

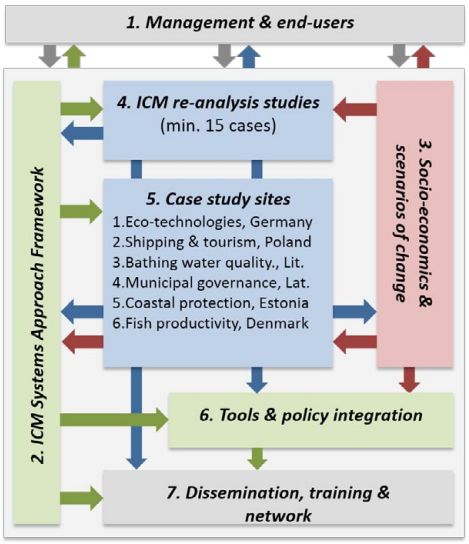
With a surface area of 415,000 km^2 the Baltic Sea is the largest inner European sea, surrounded by nine countries, Sweden, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Russia. Because of its ragged coastline with many embayments, lagoons and estuaries, an estimated coastline length of 70,000 km as well as an average depth of only 52 m, the entire Baltic Sea is a shallow coastal sea. In comparison, the Mediterranean Sea has a 30 times higher average depth of 1500 m. The Baltic Sea possesses strong salinity gradients and an estuarine circulation and can be regarded as a large transitional water or estuary itself. These facts already indicate the outstanding importance of the coastal zones in the Baltic.

Ecosystem Services provided by seas and coasts

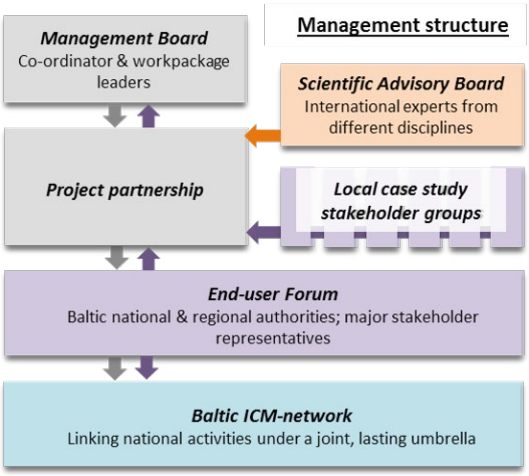
The Baltic Sea and its coasts provide numerous ecosystem services to humans that can be subdivided into provisional (e.g. food, fodder, fertilizer as well as genetic, pharmaceutical and chemical resources), regulating (e.g. local climate, nutrient transformation and retention, toxic algal blooms), cultural (e.g. recreational, spiritual and historic services) and supporting services (e.g. biogeochemical cycles, primary production, biodiversity and habitats). Further, coastal systems, especially bays, lagoons and wetlands, serve as natural filters between the Baltic Sea and its large watershed. However, the use of the Baltic Sea ecosystem services and its coastal zones is far from being sustainable. The Baltic Sea region counts about 85 million inhabitants (17 percent of EU population) and coastal zones are population hot-spots and under immense pressure from human activities and uses. Further, sea and coasts still suffer from pollution and the status of the environment continues to raise concerns.

Challenges in the Baltic Sea Region

Several future challenges affect Baltic coasts and require adaptation strategies and measures. According to HELCOM (2013), the Baltic Sea region has warmed faster than the earth as a whole and there is a need to be prepared for extreme weather conditions and events, flooding and intensified erosion. Increasing population and agriculture have resulted in an increasing eutrophication, which is manifested by algal blooms, turbid water and loss of submerged vegetation in practically all Baltic coastal waters.



The figure shows the structure of BONUS BaltCoast with its seven work-packages. Before the Systems Approach Framework for Integrated Coastal Zone Management (ICZM) (WP 2) and supporting tools (WP 6) are further developed and tested in 6 local case studies (WP 5), a critical re-evaluation of existing best practise examples is carried out (WP 4). Approach and results are presented in this issue.



The figure reflects the management structure of BONUS BaltCoast. The international Scientific Advisory Board guides and evaluates the scientific results and ensures that they meet a high international standard and are state-of-the-art. The local stakeholder groups in each case study site and the international End-user Forum ensure that approach and new tools have a high practical relevance and support policy implementation.

Despite improvements during the last decade the present agricultural policy may cause intensified agricultural production and increases the eutrophication problem again, at least in some Baltic regions. In several Baltic countries an ongoing concentration of population and tourism in the coastal zone is visible. Harbours are extended, shipping channels deepened and ship-traffic is expected to further increase. All these aspects indicate that the pressure on Baltic coastal zones will increase in the future.

The need for effective coastal management in the Baltic

Integrated Coastal Zone Management (ICZM) is the major approach that shall help to solve these problems, to deal with the challenges and to ensure a sustainable development of coastal areas. A comprehensive definition of ICZM is provided by the European Commission (1999): 'ICZM is a dynamic, continuous and iterative process designed to promote sustainable management of coastal zones. ICZM seeks, over the long-term, to balance the benefits from economic development and human uses of the Coastal Zone, the benefits from protecting, preserving, and restoring Coastal Zones, the benefits from minimising loss of human life and property, and the benefits from public access to and enjoyment of the Coastal Zone, all within the limits set by natural dynamics and carrying capacity'. The term 'integrated' refers to the integration of objectives; multiple instruments needed to meet these objectives; relevant policy areas, sectors, and levels of administration; the terrestrial and marine components; time and space, as well as different disciplines.

Despite many efforts, ICZM still suffers from weaknesses, e.g. insufficient political and legal status or the lack of a consistent and applicable process for practitioners and policy makers. For a long time ICZM remained too vague and was lacking a systematic tool to address and solve problems in a stepwise guided process. This tool is the Systems Approach Framework, or SAF. Developed through the project SPICOSA by 54 research institutes and universities across the EU, SAF is a holistic approach to coastal management. By incorporating a human dimension into the definition of coastal systems, SAF enables scientists and policy makers to understand how ecosystems and societies interact. Focused on collaboration, the framework supports deliberative decision-making processes aimed at improving the sustainability of coastal systems. The goal is to implement suitable ICZM policies and bridge gaps between different stakeholders. SAF is an effective way to improve the ecological sustainability, economic efficiency, and social equity in our critically important coastal areas.

BONUS BaltCoast – solutions for the Baltic and beyond

'The joint Baltic Sea research and development programme (BONUS) aims to facilitate generation of fit-for-purpose knowledge and know-how necessary to overcome the major challenges faced by the Baltic Sea region' (BONUS 2014). It aims at providing science for a better future of the Baltic Sea region. Within the BONUS framework the project BaltCoast 'A Systems Approach Framework for Coastal Research and Management in the Baltic' is being funded with a budget of about 3 Mio. Euros between 2015 and 2018.

BaltCoast is applying, adapting and further developing SAF to management challenges throughout the Baltic. The project aims to create transferable, user-friendly tools that integrate ecosystem capacity, environmental forcing, human activities, and political processes. BaltCoast is developing and testing tools and methods that support ICZM. In many coastal case studies, it takes 20 years or more between recognition of a coastal problem until the implementation of solutions. With the help of the SAF as a tool applied in ICZM and supporting methods, this time shall be reduced. A faster response to problems allows a faster adaptation to changes and, against the background of ongoing climatic changes and other increasing pressures, this is urgently needed.

For more information, please visit: www.baltcoast.net

Gerald Schernewski, Josianne G. Støttrup and Rebecca Boslough
Leibniz Institute for Baltic Sea Research Warnemünde
Germany
Technical University of Denmark

The BONUS BaltCoast team during the project meeting in Murcia in March 2016, ©EUCC-D

Re-evaluating best-practice ICZM case studies around the Baltic Sea

All around Europe, many Integrated Coastal Zone Management (ICZM) policies, projects, initiatives and activities have been developed during the last few decades at local, regional, and national levels. To foster the exchange of experiences and learning from best practice examples, the European Commission maintains the OURCOAST online database (http://ec.europa.eu/ourcoast), which includes 350 case studies on major themes such as adaptation to coastal risks and climate change, planning and land management instruments, and institutional coordination mechanisms, as well as information and communication.

Despite all efforts, ICZM still seems to suffer from several weaknesses. Nineteen best-practice ICZM case studies from all countries around the Baltic Sea have been re-evaluated with the aim

- to better understand strengths and weaknesses of ICZM case studies around the Baltic Sea;
- to analyse the degree of implementation of the Systems Approach Framework (SAF);
- and to identify possible needs for improvement of both, the SAF and ICZM practice.

Most of the reviewed cases have been taken from the OURCOAST database. The case studies address a wide range of ICZM themes, such as coastal protection, tourism management, integrated managements of harbour cities and coastal resorts, restoration of coastal habitats and others more. The re-evaluation was conducted by the means of a comprehensive interview series, based on a questionnaire, with local ICZM experts that were familiar with the re-evaluated cases.

Re-analysis case studies

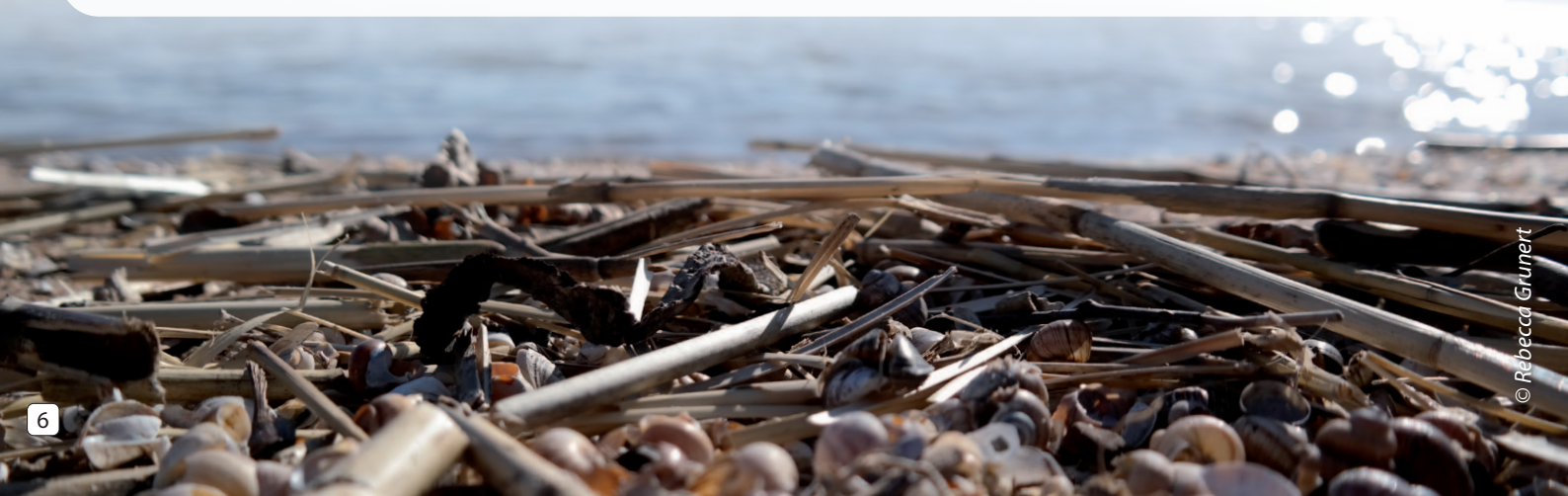
Germany
- Coastal realignment and wetland restoration Geltinger Birk
- Coastal protection & realignment and the role of public participation in Markgrafenheide
- Coastal protection management: Timmendorfer Strand – Scharbeutz

Poland
- Changing policy to halt the effects of beach erosion and to sustainable manage tourism on the Hel Peninsula
- ICZM based development of a Natura 2000 management plan for the Szczecin Lagoon

Denmark
- Integrated management of mussel fishery and aquaculture under changing baselines due to regime shifts in the Limfjord
- Fishery and aggregate extraction in the Sound

Lithuania
- Habitat restoration through sustainable agricultural practices, Rusne
- Integrated shoreline management for a large harbour city and an adjacent seaside resort

Russia
- Russian part of the cross-border Nemunas River Catchment
- Vistula Lagoon – comprehensive management of a water body



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Latvia
- The use of diverse instruments to ensure multi-use sustainability in a port city: The Ventspils case of voluntary municipal Environmental licensing system
- Town of Liepaja, spatial and sectoral planning of a municipality beach and the nearby coastal zone development
- Pavilosta Gray Dune: A comprehensive self-organized public process for the establishment of a Natura2000 site in Latvia

Estonia
- The Järve-Nasva case-study site on Saaremaa island – coastal protection
- Kunda Port development

Finland
- Coastal management strategy for southwest Finland
- ICZM in the Bothnian Sea, western Finland

Sweden
- Implementation of the Water Framework Directive: The North Baltic Water District in Sweden

Best-practice or best practice?
As a result of the re-analysis, it became apparent that various ICZM elements as defined by the SAF are already standard within the Baltic Sea Region, partly because they have been included in European regulations and/or in national law. However, some of the reviewed case studies, all of which were considered as best-practice examples, did not follow the theoretic concept as outlined in the SAF at all. Actually, not all of the OURCOAST cases seem to be best-practice cases in the sense that they were able to implement unambiguous solutions after having gone through a theoretically perfect ICZM process. Nonetheless, they may bring to light valuable experiences.

Analytical shortcomings found in 2/3 of the cases
The SAF emphasises the need for a sound and future-orientated analysis of given problems and envisaged solutions, including ecological, social, and economic dimensions. In most of the analysed case studies, the practice has been different from the SAF theory. Comprehensive systematic analyses or even model-based approaches were seldom and did usually not cover all three pillars of sustainability. Also the quality of future-oriented scenarios, if applied, was often considered as poor. All in all, the analytical basis for the decision-making was often weak.

Process duration
Very often the reviewed ICZM processes lasted for years, some even more than a decade. While weaker processes needed much time to solve conflicts that were produced in the beginning, stronger processes partly needed much time to organise the ICZM process, to get stakeholders on-board, and to do analytical work. Especially process design and issue identification have shown to be of crucial importance for the overall process. If these steps were incomplete or done incorrectly, this impacted the ICZM process negatively during later stages. But independent from the question, whether an ICZM process worked more or less smoothly, the long duration of planning and implementation periods seem to be a systematic challenge in ICZM. This increases not only the probability of changes in external drivers, which might affect the ICZM process, it also has shown to influence the willingness of stakeholders to participate negatively. The longer a process lasts, the more stakeholders may get tired of participation events.

SAF improvement required
The re-analysis also identified a shortcoming of the SAF, which so far does not include a monitoring and evaluation step. A regular evaluation of the ICZM process, the appropriateness of its outcomes in a changing environment or of the implementation are currently not required by the SAF and such a monitoring was absent in most of the analysed case studies.

More detailed insights from seven out of the 19 re-evaluated case studies are given on the following pages. Enjoy reading!

Holger Janßen
Leibniz Institute for Baltic Sea Research Warnemünde
Germany

Raimonds Ernsteins
University of Latvia

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Best practice re-analysis: Denmark - Grains of sand, a sunken treasure?

Øresund is a narrow sea dividing Denmark and Sweden. Citizens living near its coast enjoy boating, diving, bathing and angling. Øresund is also one of the busiest shipping lanes in the world and for safety reasons trawl fisheries have been prohibited since the early 1930's. As a result, marine habitats and fish populations thrive and are in better condition than in neighbouring seas. Coastal citizens treasure Øresund and commercial gillnet fishermen make their living catching many fish species. Meanwhile, the city of Copenhagen is under rapid development. Land is being reclaimed to construct a new neighbourhood and the city's metro system is currently being expanded. Such projects need vast amounts of sand, much of which is extracted from designated sites in nearby Øresund. These extraction sites have been in use for decades and the relatively constant levels of sand extraction have largely been tolerated by stakeholders, despite their never having been directly involved in decision making. Thus sand extraction and fishing co-existed for some decades. However, due to a spike in 2012 and 2013 in the volume of sand extracted for use in urban development projects, the sand extraction activity became even more visible, also in the extraction site where the sea bottom became several meters deeper. Local fishermen, NGOs and concerned citizens organized protests and media campaigns demanding a halt to further sand extraction. As a result, sand extraction was halted until more knowledge was gathered to provide information for new extraction policies, a process which is still underway.

It is highly likely that these conflicts could have been avoided with more intense research to inform decision making and more direct stakeholder involvement in the designation of extraction sites. As a direct result of the widespread dissent of affected stakeholders, new studies and reports were commissioned by the Ministry of Food and Environment of Denmark, which is responsible for marine aggregates. These studies included an economic analysis of the costs of obtaining sand from Øresund versus alternative marine and terrestrial sites, detailed mapping of substrates and nature types in selected marine areas, a study on the impacts of previous sand extraction activities and a report describing the distribution of fish habitats in the Danish part of Øresund, based on existing information and interviews with Øresund fishermen. The latter is of importance, because fish require different habitat types to complete their life cycles and impacts on these habitats may therefore affect fish populations.

The studies reveal that sand extraction sites overlap substantially with areas in Øresund that serve as habitat for several commercially important fish species. In addition, mapping of substrates identify several of these locations as isolated and often prominent features of the Øresund seafloor with hydrological characteristics that add to their natural value and their quality as fishing grounds for gillnetters and anglers. Finally, the economic analysis concludes that sand can in fact be obtained from alternative sites, albeit at higher extraction and/or transport costs for the entrepreneurs in Copenhagen.

The seafloor before and after sand extraction.

It can be argued that the improved knowledge base provided by the above studies would have been sufficient to inform an Ecological-Social-Economic (ESE) assessment that, combined with the direct stakeholder involvement prescribed by a Systems Approach Framework (SAF), could have facilitated the balancing of trade-offs between the city of Copenhagen's need for sand and conservation of important fish habitats and fishing grounds, thereby easing compromise, fostering equity and minimizing conflict.

Thomas Kirk Sørensen, Josianne G. Støttrup and Grete E. Dinesen
Technical University of Denmark


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Timmendorfer Strand/Scharbeutz - A successful Systems Approach Framework application in practice

Timmendorfer Strand and Scharbeutz are seaside resorts at the German Baltic coast. In the late 1990s, 1.3 million tourist overnight stays were recorded. During summer 1999, it became obvious that the coastal flood defence beach wall is deficient and that about 6000 inhabitants, who live in flood-prone areas, are potentially endangered by extreme storm surges. Especially against the background of climate change and ongoing sea level rise, actions towards a better and more comprehensive protection had to be taken. Responsible for coastal flood defence are the municipalities and state administration provide technical and financial support. However, the local population was very sceptical towards coastal flood defence and its potentially negative impact on tourism.

After a stakeholder mapping, 65 persons were invited to a first public meeting organized by the ministry and a consultant company.


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During 5 subsequent moderated meetings, up to 25 participants carried out the steps of a Systems Approach Framework using the Malik Sensitivity Model®Prof. Vester. The region was characterised by various variables; the effects (strength and direction) of the variables on each other were estimated; a conceptual sub-model focussed on coastal defence was extracted; five alternative coastal defence scenarios were developed and semi-quantitative long-term model simulations scenarios were calculated.

After several months, the results were presented on a public meeting, intensively discussed and the group recommended the implementation of a combination of coastal protection and flood defence measures. This case study is an outstanding example for the application of a Systems Approach, without calling it so. The successful implementation was finished only in 2011.

This case study is well documented in Kaul & Reins GBR (2001) and Hofstede (2004) under the OurCoast-website (http://ec.europa.eu/ourcoast).

SWOT-analysis

Strength
- Active involvement of the affected people
- Systematic approach
- Transparency of results
- Carried out during one year

Weaknesses
- Low number of participants (compared to the affected)
- Tiresome and time-consuming procedure
- Depending upon volunteers

Opportunities
- Recognition of the problems
- Awareness of responsibilities
- Acceptance of solutions

Threats
- Results may not be conform to contractors expectations
- Loss of interest during meetings
- Not enough participants
- Slow implementation (2011)

Modified after Hofstede (2004)

Gerald Schernewski
Leibniz Institute for Baltic Sea Research Warnemünde
Germany

Re-analysis study of coastal management of Hel Peninsula, Poland

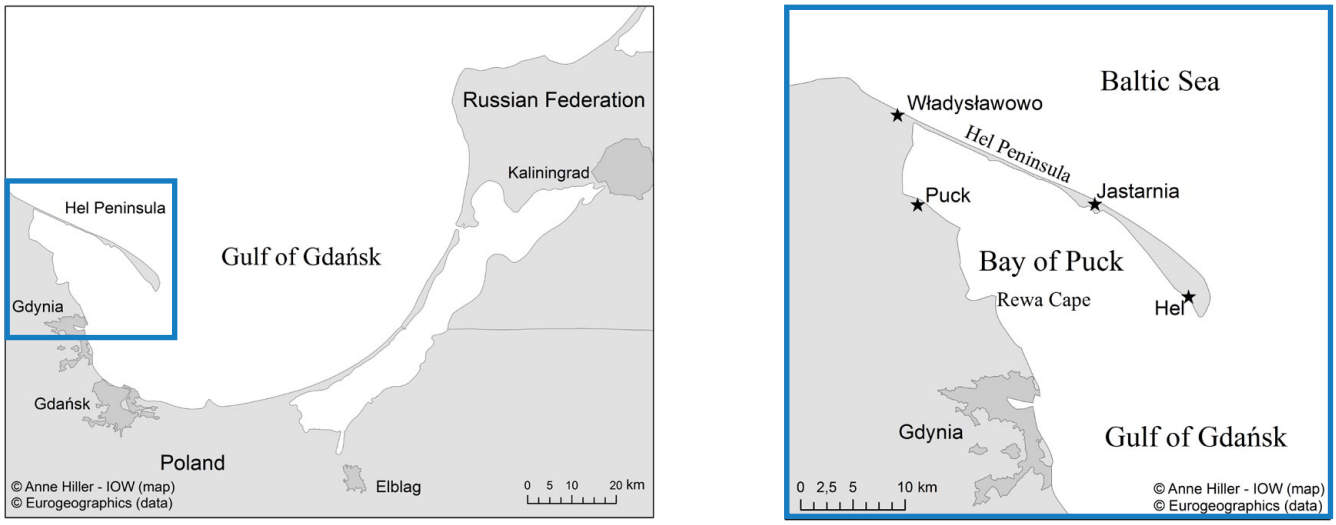
The re-analysis is focused on the safety of Hel Peninsula – a thin sandy spit in the Gulf of Gdańsk in Poland. The safety is achieved by the maintenance of Peninsula's shoreline configuration ("hold the line" approach) with massive beach nourishments on the open sea side, supplemented by dunes with a concrete core, masked with sand and plants. Such a scheme is intended to create as much a natural look of the area as possible, in order to attract tourism, which is becoming the main engine of local economy, intended to replace fisheries – the area's traditional profession.

The Hel Peninsula management illustrates a very positive role of coastal administration in Poland (Maritime Offices within the Ministry responsible for maritime affairs). The Offices possess legal instruments that provide them with full jurisdiction in the exclusive economic zone, territorial sea and beach proximity and shared jurisdiction (with local authorities) in the immediate hinterland. This way, there is no competence clash at the sea-land interface and the competences of local authorities and Maritime Offices in coastal hinterland can be harmonized, usually by stakeholder consultations, organized by the territorially relevant Maritime Office.

The maintenance of beaches is financed by the Coastal Protection Act of the Parliament dating back to 2003. Hel Peninsula is the most rigorous case study that proves the success of this act. Safe and nicely looking beaches attract numerous tourists in the summertime and secure a decent income for the local population of ca. 20,000 residents. It allows a profession change from fisheries to sustainable tourism and is in line with the HELCOM convention and Baltic Sea Action Plan – two Pan-Baltic instruments established to achieve sustainability of the Baltic Sea – a very precarious basin from ecological and socio-economic point of view. In Poland, the vulnerability of sandy beaches to storms and climate change effects is another factor that must be taken into account. This development underlines the fact that a coastal administration equipped with a suitable legal basis can work together with local authorities and harmonize top-down and bottom-up activities for coastal communities.

In this way integrated coastal zone management can positively combine physical processes, ecology and socio-economic issues making use of their synergies while alleviating conflicts and competition related to uses of limited resources. Continuation of this achievement requires succession of the Coastal Protection Act from 2024, which must include a full protection of the Peninsula, while less exposed coastal segments can be allowed to retreat in reasonable bounds.

Grzegorz Różyński and Małgorzata Bielecka
Institute of Hydroengineering, Polish Academy of Sciences
Poland



Gulf of Gdańsk and Hel Peninsula

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Benchmarking of a Systems Approach in Cross-border Management of the Vistula Lagoon and the Nemunas River Catchment, Kaliningrad Oblast (Russia)

Among the BONUS BaltCoast project re-analysis case studies, two have addressed cross-border co-operation with the Kaliningrad Region (Oblast) of Russia. These are: 1) Nemunas River Lower Course Catchment cross-border management integration (Russia – Lithuania), and 2) Vistula Lagoon cross-border management integration (Russia – Poland). The Kaliningrad Region is an exclave of the Russian Federation sandwiched between two EU countries – Poland in the south and Lithuania in the north. Its situation is unique not only in political terms but in geographical terms as well. It shares two large coastal lagoons with its neighbours: Vistula Lagoon with Poland and the Curonian Lagoon with Lithuania, also sharing the catchment of the Nemunas River, the largest tributary of the Curonian Lagoon. Due to this unique situation, and demand of the EU Water Framework Directive (Article 13.3), there is a permanent need for the Russian federal and regional authorities to cooperate closely with the neighbouring countries in the lagoon and river catchment management. The objective of our study is relying on a Systems Approach Framework to assess the coherence of the cross-border cooperation between Russian and Polish authorities in the management of the Vistula Lagoon and between Russian and Lithuanian authorities in the management of the Nemunas River Catchment.

The main findings of our study are that the management of water and living resources of the Vistula Lagoon and of the Nemunas River Catchment by Russian authorities is quite systematic in institutional and in planning terms. Sophisticated simulation models are applied to validate management scenarios and identify optimal solutions. Close cross-border relations exist on personal level among the key persons in Russia, Poland and Lithuania. Yet, practical cross-border cooperation between Russian, Polish and Lithuanian authorities is limited to sharing environmental information and joint decision-taking on fishing quotas in both lagoons. Neither there is any active involvement of local stakeholders into preparation and implementation of the management documents, which make them void of any practical impact on the water quality in both lagoons. Existing bilateral agreements between the Russian Federation, Poland and Lithuania do not cover such key aspects of cross-border cooperation like coordinated control of pollution discharges from point and diffuse sources or strategic environmental impact assessment of anticipated development plans.

Ramunas Povilanskas
Klaipeda University
Lithuania

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Re-analysis study of Port Kunda

Kunda is a small industrial town on the northern coast of Estonia, about 110 km east of Tallinn. The main enterprises in the town are a cement factory and a pulp mill. There was an urgent need to export cement and later also timber via a new port on the coast of Kunda Bay at the beginning of the 1990s. The old port, constructed in 1805, stopped operating in 1940 and remained unused during the entire Soviet time until 1994.

The process of creating a new port started with discussions in 1994 and by selecting an appropriate site for the new port. The key tasks were: (1) not to disturb the normal functioning of the local ecosystems; (2) to avoid clogging of the outlet of River Kunda (Fig. 1) and (3) to prevent erosion of the adjacent sandy beaches, which have been very popular vacation sites for the local people (Fig. 2). As a result a whole complex of field studies that lasted for many years was initiated.

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Outlet of River Kunda

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Sandy beach west of the port

River Kunda is an excellent spawning ground for valuable fish species, of which the preservation is highly important. Additional preservation is needed for sandy beaches. The scientists and experts were facing a serious challenge on how to locate and build the new port so as to control the sediment movement in the area. It was also necessary to know if the eroded sand from the beaches would clog the river mouth or if it would be transported offshore. A stony shoal just opposite the old river mouth was a potential sedimentation trap favouring the siltation of the river outlet in the past. To prevent that undesirable process, the riverbed had been shifted a few hundred meters west from the initial position some decades earlier. The expertise proved that the new port would not cause any siltation at the river mouth.

A number of maps and large-scale plans from different times, including historical marine and navigation maps, were used and many different instrumental surveys were performed during the preparatory stage. Negotiations were held with different stakeholders until the right place for the port was finally determined. After constructing the port, a monitoring programme was launched, in order to reveal possible undesirable effects. The results of monitoring and expertise over the last decades show that the site selection, as well as the measures applied to construct a new port in Kunda have been justified. The monitoring results reveal that the jetties in the port prevent the longshore transport of sand to the east and favour the accumulation process and expansion of the beach west of the port. The vessels up to 8.5 m draft have been served in the port basin without any problems over the last decades. As the bottom sediments around the port are more or less stable, the navigation channels do not need frequent dredging. A new road, connecting the factories and the port, was built in order to leave residential areas undisturbed.

The whole process appeared to be quite similar to SAF despite the use of different technical tools and a much lower level of awareness of spatial planning among the people in the beginning of the 1990s.

Kaarel Orviku, Hannes Tõnisson and Are Kont
Tallinn University
Estonia

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Finnish and Lithuanian perspectives on ICZM: A comparative analysis based on the 'Systems Approach Framework' methodology

Within the BONUS BaltCoast project an analysis was conducted on if and at what point a Systems Approach Framework (SAF) would have been beneficial for the re-evaluated case studies, which are based on joint, standardised criteria. It provided an excellent opportunity to compare ICZM approaches in different countries. Three case studies have addressed ICZM issues on a larger, sub-national scale: 1) a Lithuanian mainland Baltic Sea coast; 2) Southwest Finland and Turku Archipelago, and 3) a Finnish coast of the Bothnian Sea.

Both in Lithuania and in Finland interests in ICZM have grown by the end of the 20th century following a widespread acknowledgement that the coastal zone, due to its exceptional dynamic and concentration of conflicting interests, requires different planning approaches than those traditionally applied to spatial planning. However, unlike in Finland, where the Baltic Sea coastline is much longer than in Lithuania, the Lithuanian ICZM programme has been developed and approved on the national level, while in Finland it was left to the responsibility of the regions.

On a regional level, the implementation of the Lithuanian National ICZM Programme has been entrusted with the administration of Klaipeda region, while in Finland the implementation of the regional ICZM programmes was largely a responsibility of local self-governments, coordinated by regional authorities. Despite these differences, all three programmes should be regarded as best ICZM cases since they have been successfully implemented in practice and integrated into the spatial planning system.

However, differently from Finland, where the development, approval, and implementation of the ICZM programmes extensively included regional stakeholders and the general public, in Lithuania there was no active involvement of regional and/or local stakeholders into preparation and implementation of the ICZM programme. Therefore, in terms of the SAF, the two Finnish case studies are much more systematic and comprehensive than the Lithuanian one.

The most important lessons learned from these three case studies are the following:
1) Continuous funding and integration of an ICZM programme into an existing national and/or regional spatial planning and management system is critically important for the success of the programme;
2) Making the best use of up-to-date GIS information and aerial photos for a more detailed identification of points of conflict in the area; and
3) The extensive inclusion of regional stakeholders and the general public to ensure a shared understanding of ICZM.

Ramunas Povilanskas
Klaipeda University
Lithuania

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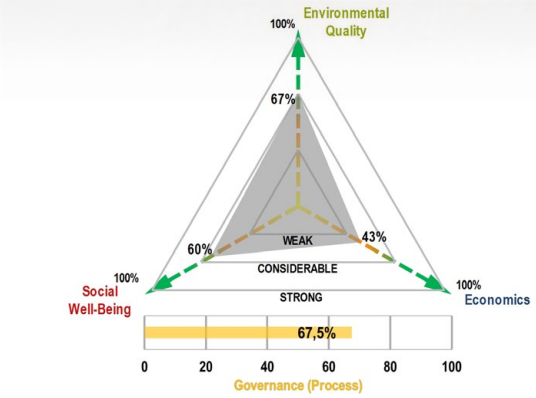
Assessing performance and success of coastal management case studies from a sustainability perspective

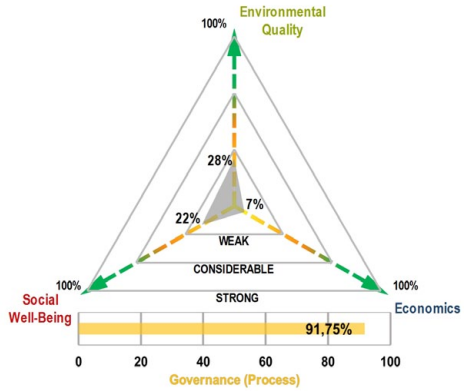
In 2013, Marie Pendle published a report in which she compared predictions and results of estuarine and coastal managed realignment sites in England. Based on this analysis, she came up with several general recommendations: 'Success criteria should be explicitly defined prior to site development' and 'Key performance indices of sustainability should be developed, included in predictions and thereafter monitored to provide evidence that managed realignment meets economic, social and environmental sustainability.' Her observations and recommendations express a general demand.

With over 350 coastal management case studies, the European OURCOAST database 'aims to ensure that lessons learned from the coastal management experiences and practices - can be shared and are made accessible to those who are seeking sustainable solutions to their coastal management practices' (European Commission, http://ec.europa.eu/ourcoast/). These case studies are considered to be coastal management best practices. In a previous article, the process from the first idea until the implementation of measures has been assessed. Here, the question is whether the final result, after the implementation, was a clear step towards sustainability?

In the past, several international projects like SUSTAIN, QualityCoast, COREPOINT or DEDUCE already developed indicator systems to measure the state of and progress towards sustainability at the coast. However, apart from the tourism labelling system QualityCoast, they were hardly applied in practice. The BaltCoast evaluation tool builds upon these previous projects and provides a set of 45 indicators that are grouped into four categories, namely Environmental Quality, Economics, Social Well-Being and Governance. This system is applied to a wide range of coastal case studies to assess and quantify their success and to reveal their strengths and weaknesses. Several examples are shown here.



Geltinger Birk



Timmendorfer Strand

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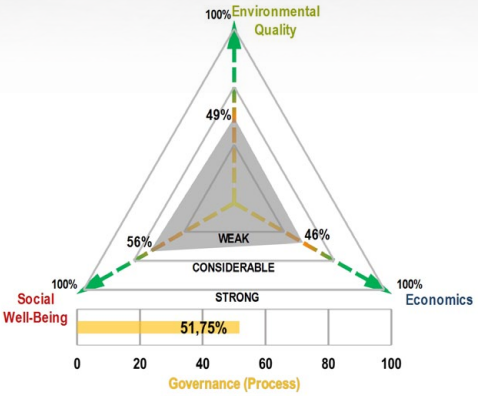

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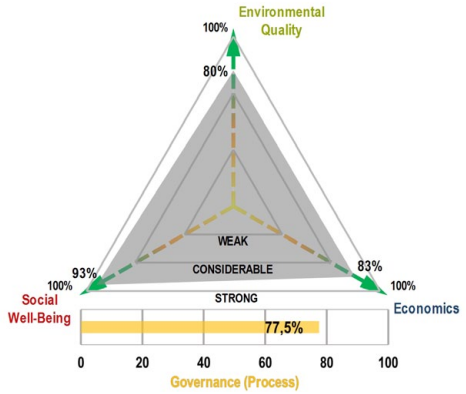

Southwest Finland

Coastal realignment and wetland restoration Geltinger Birk (Germany)

The implementation of a coastal wetland flooding in an area of nearly 10 km^2 is well reflected by the indicator set. It improves the local state of sustainability and especially has positive impact on environment quality. It promotes flood prevention, protection and mitigation and positively effects land use planning and management, natural habitats, biodiversity and their quality. The measure increases low-impact tourism and investments in coastal management and the entire process was well documented and accepted by the public.

Public Participation in Integrated Flood Risk Management in Timmendorfer Strand (Germany)

In Timmendorfer Strand a flood protection system was established after intensive and successful public participation. The process followed the SAF and can be called a best practice example. The measure itself has only slight positive effects on sustainability. It promotes flood prevention, protection and mitigation, it increases the resilience and reduces vulnerability to climate change impacts and also increases payments and investments in coastal management (on climate change and flood risk management).

Restoration of important habitats through sustainable agricultural practices, Rusne (Lithuania)

The implementation of habitats contributes to sustainability in general. It effects land use planning and management, supports environmentally friendly rural activities and natural habitats, biodiversity and their quality. It increases investments in coastal management, low-impact tourism, productivity and sustainable agriculture. The implementation process had several shortcomings.

Coastal management strategy for Southwest Finland

The implementation of this strategy effected sustainability strongly and positively. It improved land use planning and management, supports natural habitats, biodiversity, urban planning and environmentally friendly rural activities. It further ensures an acceptable employment for local residents and increases production of local and fair trade goods and services. The concept was accepted by the public.

Donalda Karnauskaite and Gerald Schernewski
Leibniz Institute for Baltic Sea Research Warnemünde
Germany

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